SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Fit a parabola by method of least square to the following data also estimate y at $x = 6$.

x: 1 2 3 4 5
y: 5 12 26 60 97

17. Find the positive root of $f(x) = 2x^3 - 3x - 6$ by Newton Raphson method correct to 5 decimal places.

18. Solve by triangularization method the following systems.

$x + 5y + z = 14$; $2x + y + 3z = 13$; $3x + y + 4z = 17$

19. From the following table of half yearly premium for polices maturing at different ages estimate the premium for polices maturing at age 46 and 63.

Age x: 45 50 55 60 65
Premium y: 114.84 96.16 83.32 74.48 68.48

20. From the following table estimate $e^{0.644}$ correct to 4 decimal places using Stirling's formula.

x	0.61	0.62	0.63	0.64	0.65	0.66	0.67
e^x	1.8404	1.8598	1.8776	1.8965	1.9155	1.9348	1.9542

23UEDA12B — NUMERICAL METHODS — I

Time : Three hours   Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Write the error committed when we fit a parabola by the method of least squares.

2. Write the equation of straight line passing though the 2 points (x_1, y_1) (x_2, y_2).

3. If $g(x)$ is continuous in $[a, b]$, then under what condition the iterative method $x = g(x)$ has a unique solution in $[a, b]$.

4. State the condition of convergence of Newton's Raphson method.

5. For solving a linear system compare the Gauss elimination method and Gauss Jordan method.

6. State a sufficient condition for Gauss Jacobi method to converge.

7. Find the sixth term of the sequence 8, 12, 19, 29, 42.

8. Write the relation between the operators δ and E.

9. Which formula gives a better result if $\frac{1}{4} < u < \frac{3}{4}$.

10. Write Gauss forward interpolation formula.

SECTION B — $(5 \times 5 = 25 \text{ marks})$

Answer ALL questions.

11. (a) Find a straight line fit of the form $y = ax + b$ by the method of group averages for the following data :

x	0	5	10	15	20	25
y	12	15	17	22	24	30

Or

(b) Fit a curve of the form $y = ab^x$ to the data.

X	1	2	3	4	5	6
Y	151	100	61	50	20	8

12. (a) Find the Positive root of $x - \cos x = 0$ by the bi-section method.

Or

(b) Find the positive root of $xe^x = 2$ by the method of false position.

13. (a) Solve the system of equations by Gauss elimination method.
$x + 2y + z = 3;\; 2x + 3y + 3z = 10;$
$3x - y + 2z = 13.$

Or

(b) Solve the following system of equations by using Gauss-Seidal method correct to 2 decimal places.
$8x - 3y + 2z = 20;\; 4x + 11y - z = 33;$
$6x + 3y + 12z = 35.$

14. (a) Express $x^4 + 3x^3 - 5x^2 + 6x - 7$ in factorial polynomial and get their successive forward differences taking $h = 1$.

Or

(b) Find y_6 if $y_0 = 9;\; y_1 = 18;\; y_2 = 20;\; y_3 = 24$ given that 3rd differences are constant.

15. (a) Using Gauss backward interpolation formula find the population for the year 1936 given that

Year x	1901	1911	1921	1931	1941	1951
Population in thousand y	12	15	20	27	39	52

Or

(b) Given the following table find y (35) using Bessel's formula :

$x:$	20	30	40	50
$y:$	512	439	346	243